City development under the constraints of complexity and urban governance: A case study on the application of systems modelling and 'syntegration' to the city of Fürth

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Abstract: This paper presents insights from the so-called 'syntegration' process, which helped the German city of Fürth to overcome severe financial deficit. The approach comprises both systems modelling, in order to grasp the developmental prospects of a city, and an accelerated process of consensus-building within the city, which is closely connected to implementation. Syntegration is viewed within the context of urban governance. The findings suggest that leadership is indispensable in initiating and controlling such an urban change process. 'Syntegration' and 'Malik Syntegration' are registered trade marks owned by Malik.

Originally published at:
Mieg, Harald A; Grafe, Fritz-Julius (2012). City development under the constraints of complexity and urban governance: A case study on the application of systems modelling and 'syntegration' to the city of Fürth. Journal of Urban Regeneration and Renewal, 6(1):91-100.

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Received: 20th July, 2012

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ABSTRACT This paper presents insights from the so-called 'syntegration' process, which helped the German city of Fürth to overcome severe financial deficit. The approach comprises both systems modelling, in order to grasp the developmental prospects of a city, and an accelerated process of consensus-building within the city, which is closely connected to implementation. Syntegration is viewed within the context of urban governance. The findings suggest that leadership is indispensable in initiating and controlling such an urban change process. 'Syntegration' and 'Malik Syntegration' are registered trade marks owned by Malik.

Keywords: systems modelling, syntegration, consensus building, urban governance, leadership, cross-sectoral communications

INTRODUCTION

Economic change with uncertain prospects, demographic change and empty public coffers describe a situation typical of many mid-sized German towns and cities (between 10,000 and 100,000 inhabitants). These are just some of the facets that define urban development, not only in Germany, but in many cities around the world. The question arises: How can urban development be managed effectively within the context of a multitude of external and internal pressures?

In practice, it is necessary to identify relevant factors (such as economic growth or demographic change) to understand and steer urban development. This presents two fundamental questions: First, what are the impact factors? Secondly, how do they interact? Demographic change, either through ageing of a city's population or increased migration, also influences the economic base of the city, particularly local consumption patterns. Factors for urban development go by many descriptions within the literature. For instance, at the highest level of abstraction, Pacione[1] and Stratmann[2] defined a set of 'global trigger factors' describing changes in urban development: demographic,

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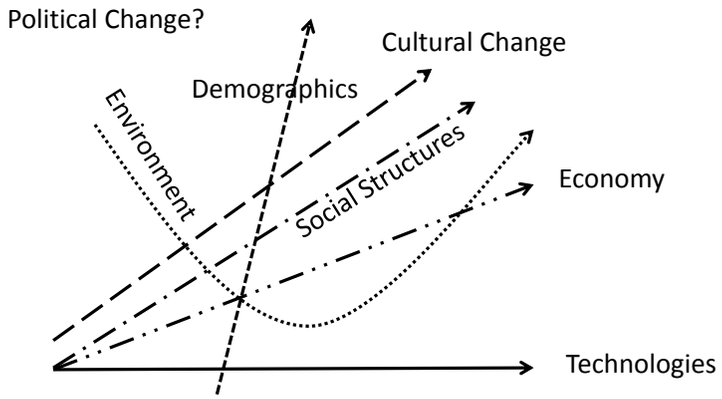

Figure 1: Trigger factors of urban development

societal (eg vertical and horizontal mobility within a city), technological, economic, cultural (eg changing values and lifestyles), political and, finally, environmental. Figure 1 shows possible interrelations between these impact factors. For instance, economic change seems to be closely tied to several others factors, such as technological change or changing social structures, whereas demographics constitutes a more independent factor. The role of politics or even political change cannot be clearly portrayed in this way.

Not every combination of factors is relevant at all times or for every example; however, the complexity increases exponentially with the number of factors taken into account; here, systems modelling comes into play. Systems modelling allows simultaneous evaluation of the interactions between a great number of factors, and thus identification of the most active factors within a system. In this context, a research project was initiated on the current use and prospects of systems modelling-based tools in cities. The following presents a case study[3] on the German city of Fürth, which is highly indebted, and sought to innovate a solution via professional consultancy and a fundamental systemic analysis of the city's options. Other cities under examination are: St. Veit, Austria; Si Ping, China; Belo Horizonte, Brazil; and Werl, Germany. The following section provides an introduction to the city of Fürth and its greatest development problem — spiralling deficit. The paper then turns to the urban change process through which the city has attempted to address this deficit problem. The third section introduces the method applied: syntegration, a consensus-building tool related to systems modelling. The final section summarises the results and highlights the issue of leadership.

THE CITY OF FÜRTH

Fürth's best-known son is the diplomat and Nobel Peace Laureate Henry Kissinger, who remains a firm supporter of Fürth's football club, Spielvereinigung Greuther Fürth. Historically, Fürth was first documented in 1007, and therefore has a typical early-medieval city foundation. Today, it is located in the Bavarian administrative district of Middle Franconia; together with Nürnberg and Erlangen, it creates a dense city triangle that forms the centre of the Middle Franconian agglomeration. This agglomeration is also the heart of the European Metropolitan Region Nürnberg, with a total of 3.5 million inhabitants. As with most European cities, Fürth experienced its most rapid growth during industrialisation, and today has

115,000 inhabitants and is considered a major city.

Economically, the brewery sector and the games industry are of great historical and contemporary significance in the region. Until recently, Fürth was host to the headquarters of Europe's largest mail order company, Quelle GmbH; however, the company is currently in liquidation, greatly affecting local business tax revenues. Fürth also considers itself an emerging research centre, with dependence on the Fraunhofer Institute as well as several solar and material science companies.

Fürth was traditionally regarded as a workers' city and continues to struggle with low educational attainment, lack of skilled workers and a large out-commuter quota of the proportion that are highly skilled. Combined with enduring economic change, all of this results in a massive household deficit that has paralysed the city in recent years. A series of failed attempts were previously made to consolidate the city budget, which were initiated internally, and also through the use of external consultancies. The decision to try the systemic approach was a 'last-ditch effort' in an attempt to avoid a 'lawnmower' policy, under which the spending of all departments would have to be reduced by 10 per cent, irrespective of how these cuts would affect the city's ability to act.

THE URBAN CHANGE PROCESS: 2010–PRESENT

The core process for adjusting urban development strategies — facing Fürth's enormous deficit — was a three-and-a-half-day-long workshop convened during summer 2010, based on a networked communication model called 'syntegration', which will be introduced in more detail in the following section. The participants were key members of the city administration, including all heads-of-department, those in charge of finances, as well as the Mayor himself. Politicians from the city parliament were not included. The workshop was guided by the question: 'From today on, how can we develop the operability of the city of Fürth in all areas, in order to permanently and effectively remove the structural deficit of €30 million by 2013?'. The target for the syntegration workshop was to identify savings of €13 million; following the syntegration workshop, potential sustainable savings approaching €21 million were identified (Ammon, S., personal communication, June 2012).

The syntegration workshop was accompanied by a systemic analysis of Fürth. The modelling exercise was based on the sensitivity model approach of Frederic Vester,[4] which encompasses impact factors within a system and defines their interrelations. Sensitivity modelling has its roots in the pioneering works of Jay Wright Forrester of MIT, who, as early as 1969, tried to apply systems thinking to cities.[5,6] It is used for studies of land-use planning: for instance, by the ETH (Zürich) or the Graduate Institute of Urban Planning (National Chung-Hsing University, Taipei).[7] In Fürth, two models were developed: one for the city as whole, and another to model internal process of the city administration.

A series of 21 impact factors were identified, which are ranked in Figure 2 according to their importance and role for the city of Fürth. The top-left area shows factors that are the strongest within the system and which, if changed appropriately, have the greatest potential to re-stabilise the system after changes occur. The bottom-right represents reactive factors, which are generally inactive and have little impact on the system, but which are themselves heavily dependent on the system. The bottom-left represents buffering factors; these stabilise the system,

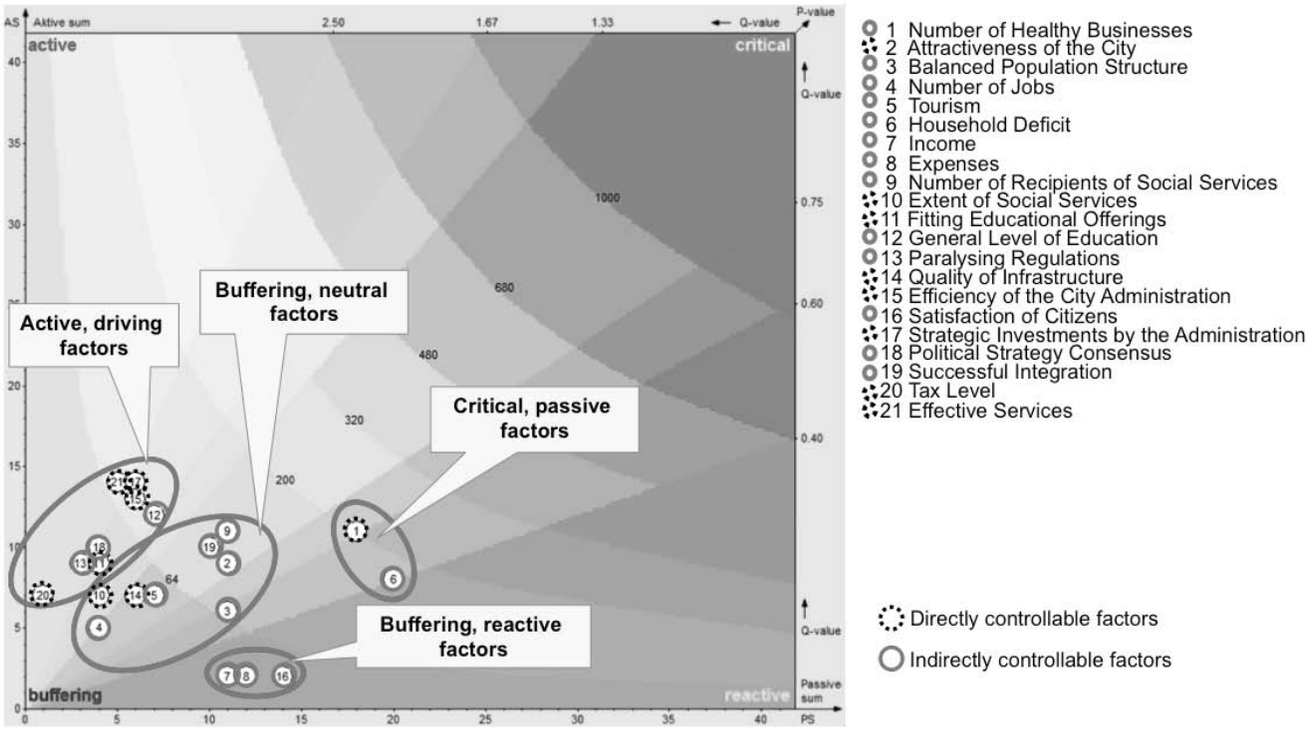

Figure 2: Importance and role of impact factors for the city of Fürth.

and react only slightly to external change, even though they are densely networked; however, they might become crucial once their tipping point is reached. The top-right represents critical factors; heavily networked, they affect the system greatly if they change. These are therefore useful for initiating change in the system.

Figure 3 shows a wire diagram for the system model of Fürth, where the boxes represent the different impact factors, the solid lines show confirming connections between these, and the dotted lines show opposing connections. The most active variables are 'effective services', 'tax level', 'strategic investments of the city administration' and the 'efficiency of the city administration'. These have the greatest potential to influence other variables, and thus represent potential adjustment levers. Other active factors to take note of are 'paralysing regulations' (by the state) and 'political unity over strategy' (in the city). These are external variables, however, and the city administration is not able to influence them directly, if at all. The model allows the construction of scenarios, for instance for the case of changing taxation levels.

The findings of the systems modelling helped to evaluate and interlink the measures that were developed during the syntegration process. The measures are classified by 12 core issues, ranked in Table 1 by their financial impact. The systems modelling aided the process of sorting through the measures and identifying those that would be the easiest to implement, those that had the biggest effect on the city system, as well as those that could prove ineffective in the long run, or which might even destabilise the city system.

The three biggest financial impacts all relate to either income improvements or cutbacks, but these measures should be

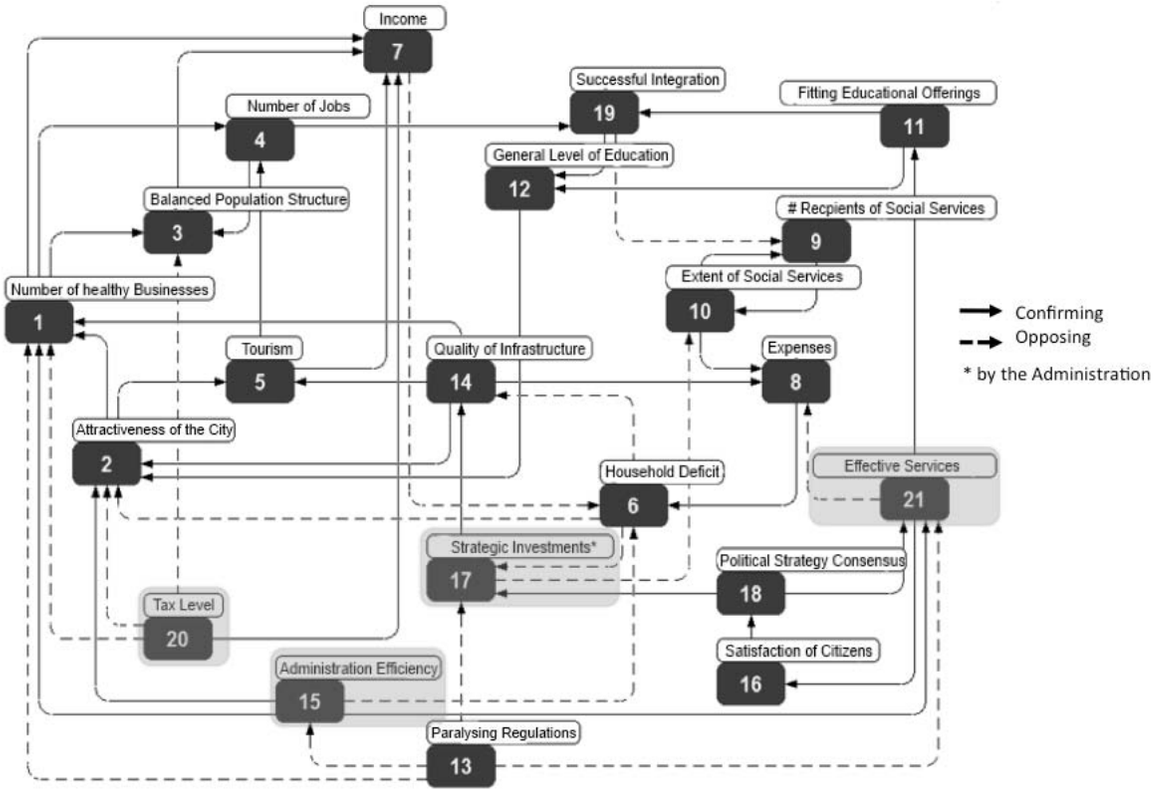

Figure 3: Importance and role of the impact factors for the city of Fürth

viewed in connection with a class of measures called 'critical task review', which respond to both 'effective services' and 'efficiency of administration' factors. The critical task review aims to identify the core tasks of the city administration and to chart them as being: (1) obligatory by law, with a set definition of how tasks are to be carried out; (2) obligatory by law, but implementation definable by the city; (3) discretionary but important, eg for the city's identity; and (4) further 'nice-to-haves'. This helped in so far as it was easier to identify areas with the greatest potential for additional savings, and those areas classified as crucial operational infrastructure that would have to be retained. As a side effect to this process, duplicate structures were also identified and rationalised, while efficiency also benefited from defining core tasks and clarifying jurisdictions.

SYNTEGRATION IN THE CONTEXT OF URBAN GOVERNANCE

This section introduces the core method applied in Fürth's change process, and will discuss its use in the context of urban governance. Syntegration refers to a cybernetic workshop format, a neologism combining the concepts of synergy and integration. The core concept is to connect and network the knowledge of decision makers of an organisation — or a city — to achieve an explicitly defined strategic goal. This workshop (lasting three to three-and-a-half days) usually results in a multitude of immediate projects and measures for solving the leading question, which are subsequently implemented. The methodology was introduced by Stafford Beer,[8] and is in use for organisational development.[9] The most common application of syntegration was developed by Fredmund Malik, who integrated

Table 1: Classes of measures resulting from the 2010 syntegration of the city of Fürth

Class of measures	Content	Financial impact
Improvement of income	Measures that increase the city's income (taxes, fees, returns from semi-public companies)	1
Contraction of social services	Savings achieved by cuts in social services	2
Sustainable reduction of costs	Measures that reduce the city's spending (restructuring the city balance)	3
Critical task review	Review of all the city's tasks, maintaining only legally binding tasks and those that are essential for the city's identity	4
Strengthening of the economic sector	Improvements to city image, public real estate management, tourism	5
Improvement of internal human resource allocation	Increasing flexibility and changing legal status of job descriptions	6
Inter-communal cooperation	Use of synergy effects and elimination of duplicate structures	7
Organisational development (of municipal administration)	Central accounting, improved event management	8
Public information and participation	E-government, commercial revenues	9
Legally binding vs. practically needed	Reducing standards in construction and public infrastructure to legal minimum	10
Strategy, politics, and administration	Strategic control	11
Improvement of internal leadership	Increase commitment, activation of unused resources and employ performance incentives	12

syntegration with systems modelling.[10]

Figure 4 depicts the current form of a syntegration process, as developed by Malik and applied in the case of Fürth. After ensuring the general objectives, the starting point is the concise definition of a leading question, which encompasses the aim of the entire process. The initiators, together with external experts, identify key stakeholders to address the given question, and invite them to participate in the following process. The methodology allows for a minimum of 20 participants and a maximum of 42, which, according to Stafford Beer, is the upper limit for efficiently networking and pooling the knowledge of all participants.[11] These participants then define the 12 most important sub-topics for answering the leading question, and discuss these within smaller taskforces comprising three iterations during the three-and-a-half days of the workshop. These discussions form the core of the syntegration process, and are represented by the icosahedron in Figure 4 (a regular polyhedron with 12 vertices), which represents the way in which the networking of all existing knowledge is established through 12 sub-topics. This core process is supplemented with various audit tools that aim to optimise the results and their subsequent implementation. At this point, the implementation of measures is set in motion by establishing a controlling mechanism that ensures long-term viability.[12]

Syntegration as a tool for urban change has two operational forms with different foci: a workshop for (1) organisational development of the city administration — as in the Fürth case — or (2) consensus-building of the city — as in the case of the German city of Werl.[13,14] In any case, the selection of participants aims to involve all key decision makers relevant to the leading question, in order to maximise the chances of successful implementation of the proposed measures. Syntegration should be seen in the context of urban governance. Governance refers to a shift in governmental agency,

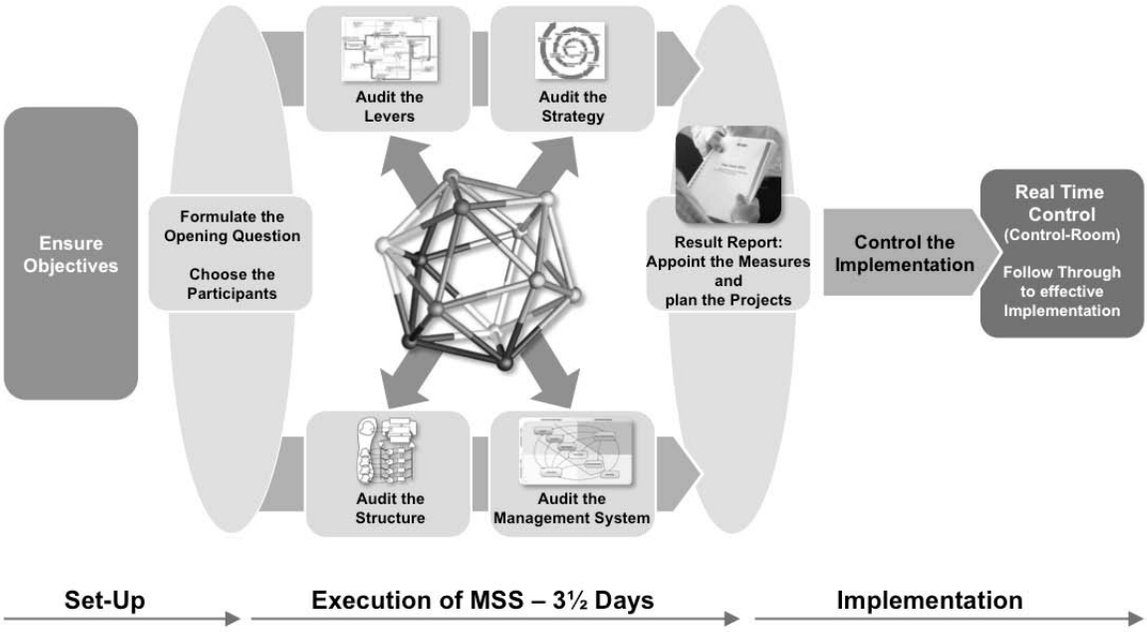

Figure 4: Syntegration process, with the icosahedron representing the networked communication process organised in 12 sub-topics. © Malik Management, St. Gallen

away from a centralised city government towards 'self-organising networks';[15] it implies a 'blurring of boundaries and responsibilities for tackling social and economic issues'.[16] Practically, urban governance results in the involvement of different stakeholders in processes of urban planning and decision making. Common forms of participation include urban consensus conferences[17] or roundtables with representatives of stakeholder groups. Consensus-building in such panels can become a time-consuming process with very fragile results, facing uncertain implementation. In contrast, syntegration attempts to speed up consensus building and to connect consensus with implementation by involving the key decision makers who will also be responsible for implementing the agreed measures. The most important outcomes of syntegration are synergies, achieved by enabling cross-sectoral communication,[18] which better coordinate decision making within a city. These effects are discussed in more detail in the next section.

EFFECTS: TOWARDS MANAGEMENT OF URBAN CHANGE

Any consultancy project, whether in an organisation or city, faces similar initial responses, such as being considered 'only one more workshop' in a series of several consultancy initiatives, or being considered as a Human Resources development project that is an interesting experience but more or less ineffective in practice, particularly with respect to the inherent inertia of administrations, whether public or private. Common reactions to new measures very often range from 'not developed here' (and therefore not relevant), through 'we already tested this measure years ago — it didn't work', to unspoken worries about one's own capabilities to cope with change, or potential risks to one's job by the redefinition of tasks. Any consultancy project must develop its own responses to these initial misgivings. Syntegration is designed, first, to be fast: the results must be presented after three-and-a-half days (consensus, measures and systems

models); and, second, to connect consensus building with implementation by involving all relevant decision makers in the consensus building. The three core effects of the city syntegration process are:

- *Cross-sectoral communication:* The administration of a city of 100,000 or more people is divided into several departments, such as finance, social affairs and city infrastructures. This separation is useful for day-to-day operations; however, it can become impedimental in solving more complex problems or when organisational changes seem necessary. As mentioned, syntegration fosters trans-functional communication and leads to cross-sectoral networks. From the perspective of the Fürth city administration, this has been the primary trigger for any change. Cross-sectoral communication creates not only transparency with regard to current tasks and projects, but with regard to how effective responsibilities are fulfilled by the various positions in the city administrations.
- *Re-evaluation and bundling:* Many of the measures defined in the syntegration process are not new, but the syntegration helps to re-evaluate and bundle existing projects, measures or ideas. A core new measure in this respect is the critical task review. Fürth has to rethink its portfolio of public services — some are legally binding, some are specifically important for Fürth, while others are nice to have. Here, systems modelling or systems thinking helps to frame and differentiate the mandatory from the aspirational. Local politics and public debates will come into play in any case — for instance, in proposals to rationalise or close city-financed cultural institutions.
- *Synergy and integration:* Syntegration derives from 'synergy' and 'integration'. One of the unexpected effects of syntegration was to identify the many duplicated structures within the city administration. As a consequence, Fürth is developing an integrated event-management structure. Identifying synergies and redundant structures should naturally be seen within the context of increasing efficiency; however, it also has a strategic aspect: synergy and integration are the basis for rethinking the city's profile. What is the particular story of this city? In consequence, what are the city's 'effective services' as defined in the systems model (see Figures 2 and 3)? For example, Fürth is about to change from a worker's city to a 'young city', hosting students and young families as part of the European Metropolitan Region of Nürnberg, with universities and new creative industries.

These effects or triggers have to be embedded in an urban change management project. This implies two conditions: first, leadership and, second, control over the process of implementing measures. Process control, that is, the coordination and control of the resulting projects, is required in both forms of syntegration, focusing either on the city administration or on consensus building in the city. In both cases, it remains with the city administration to steer the implementation, even though many of the projects might be directed by external groups or key individuals, such as firms or voluntary organisations. The process should be controlled via a clear, high-level mandate with responsibility within the city administration. In Fürth, the process is managed by Dr Stefanie Ammon, the city councillor with portfolio for finance, internal organisation and human resources, who

was the initiator of the syntegration process.

Lastly, urban change triggered by syntegration requires leadership. This particularly refers to the role of the mayor or chief executive. It is the mayor who could— and should — initiate such a change process and mobilise the necessary means. The mayor's main function, however, is legitimisation. The mayor, being the focus of attention for members of the city administration and many of the citizens, defines the values and possible impact of the change process. The worst case occurs when a mayor follows a more-or-less hidden agenda that counteracts the change process. Leadership therefore requires some kind of personal integrity.[19] Needless to say, besides the legitimisation function, the mayor also has to steer the process by allocation of resources and responsibilities. In the present case, the Mayor of Fürth, Thomas Jung, took over the initiative of a change process and formed it into the political will and core project of the city of Fürth.

CONCLUSION

The conclusions can be synthesised in three points.

- A city's system model helps to integrate the planning variables of a city, and thus to evaluate measures, projects and strategies.
- It can be useful to accelerate cross-sectoral consensus building in the context of urban governance in order to realise implementation.
- Leadership is indispensable in making both tools (systems modelling and syntegration) effective with respect to long-term urban change.

It seems clear that the coordination and control of policy measures requires a clear leadership structure. In this respect, the roles of the mayor and the city administration are central. Facing the systemic complexity of cities and the implied managerial challenge, urban governance cannot dispense with leadership. Leadership today should be 'effective' —motivating the people involved;[20] in the case of Fürth, Mayor Thomas Jung stated, 'The syntegration has triggered the powers of self-healing (Selbstheilungskräfte) of our city.'

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